clinical pathway database for storing previously selected subsequent decision data elements, selected corresponding to the initial procedure decision data element, and, for each of the previously selected subsequent decision data elements, a rating value. In addition, the system includes processing means, including optionally a storage device, for selecting one of the subsequent decision data elements, comparing the selected subsequent decision data element with the previously selected subsequent decision data elements stored in the historical clinical pathway database, and, based upon predetermined correlation criteria, modifying the subsequent decision data elements within the clinical pathway database. The system further includes statistical processing means, in communication with the clinical pathway database and the historical clinical pathway database, for accessing the historical clinical pathway database, computing a pathway rating value based on the accessed rating values in the historical database, generating at least one signal corresponding to the pathway rating value, and outputting the at least one rating signal to a signal processing means.

Detailed Description Text (82):
The improved input systems of the invention make possible a new type of care, stable acute care. The above data gathering and manipulation systems rely heavily upon access to a database of clinical pathways. Pursuant to the present invention, systems for inputting this information in a format suitable for the purposes described herein are also provided.

Previous Doc Next Doc Go to Doc#

L7: Entry 2 of 2 File: USPT May 8, 2001

DOCUMENT-IDENTIFIER: US 6230142 B1
TITLE: Health care data manipulation and analysis system

Brief Summary Text (14):
Hospital length of stay and other clinical pathways are ultimately the purview of the physician. However, certain guidelines exist, such as those published under the title Milliman & Robertson Healthcare Management Guidelines by Milliman & Robertson, Inc., Actuaries & Consultants. These guidelines are gathered manually by physicians and nurses based on their collective judgment of suitable care. The gathering process is tedious and subjective. The resulting "standards" are developed not through the collection and analysis of actual data (such as would be done in preparing, for example, life insurance mortality tables), but instead are developed by committees of clinicians and others who are hired by actuarial companies and asked their subjective opinions. Therefore, these exists a need for an automated system to determine optimal treatment steps so as to improve important factors such as length of post-operative stay and recovery.

Brief Summary Text (22):
As stated previously, actuarial companies serving the health care industry today do not make recommendations to their customers (e.g., insurance companies, etc.) based upon their analysis of large collections of data as they would in other industries (e.g., life insurance), but instead use subjective, and potentially inaccurate, committees. One reason why this is true might be that actuarial companies simply have not created, nor have access to, the large amounts of data and processes needed to perform such analysis. While others have collected health care data previously, no databases exist whereby the data is organized in such a way so as to enable meaningful analysis of the data, and no processes exist to analyze such data.

Brief Summary Text (25):
The invention herein solves the drawbacks discussed above. The present invention is directed to data storage and manipulation system whereby clinical pathway data is collected for patients and stored in appropriate databases. The system is, preferably, a client/server based system where clients, such as actuarials, doctors, hospitals, nurses, insurance companies, and other healthcare providers can access a central repository of relevant clinical treatment information. A particularly effective aspect of the invention is that the system includes functionality for continuously reviewing the clinical pathway and treatment data for trends and, where appropriate, prompting appropriate parties of the need to change the default treatment protocols and clinical pathway or to change the particular treatment orders for a patient. While certain trends may be searched for explicitly, an important aspect of the invention is that it continuously reviews the ever-increasing data repository using automatically generated propositions in search of correlations between data elements, even unexpected correlations.

Brief Summary Text (35):
The communications subsystems of the invention are important to its capability of providing stable acute care and tracking clinical pathways. Point of service

communication at home using either a suitable electronic or computerized device is provided by the invention. The computer can be put into communication with a data storage/server computer via any suitable means, including a modem or network adapter.

Brief Summary Text (38):
The present invention provides systems and methods with numerous advantages. One such advantage provided by the system is the emotional advantage of sending the patient home in his or her own environment at the appropriate time, as soon as practicable under the new system. Such patients will often be more comfortable, in a psycho-social sense, and many of the difficulties that occur in the hospital regarding nursing care not being accessible are removed. A patient having a 24-hour a day caregiver directed specifically to him or her eliminates most difficulties with regard to immediate appropriate care, i.e., care that does not involve skilled nursing care such as turning on IV pumps, changing an IV bag, or working with IV medicines. In addition, skilled nursing care visits vary anywhere between two and four times a day (or whatever frequency and level of care is necessary) and amount to less burden than what is required from nurses in the hospital setting.

Brief Summary Text (41):
In addition, the present invention provides a client/server system for manipulation and analysis of data related to clinical pathways, comprising a communication network, a client workstation in communication with the communication network, wherein the client workstation comprises means for generating at least one signal corresponding to a clinical pathway decision and transmitting the at least one decision signal over the communication network, and means for receiving at least one signal corresponding to a clinical pathway modification from the communication network, and means for outputting the at least one modification signal to a signal processing means, a server on the communication network, wherein the server comprises a clinical pathway database for storing an initial procedure decision data element, corresponding to a decision point within the clinical pathway, and at least one subsequent decision data element corresponding to at least one available subsequent decision point within the clinical pathway, and a historical clinical pathway database for storing previously selected subsequent decision data elements, selected corresponding to the initial procedure decision data element, and processing means, in communication with the communication network, the client workstation, and the server, for performing the steps of receiving the at least one decision signal from the communication network, based on the received decision signal, selecting one of the at least one subsequent decision data elements, comparing the selected subsequent decision data element with the previously selected subsequent decision data elements stored in the historical clinical pathway database, and based upon predetermined correlation criteria, modifying the at least one subsequent decision data elements within the clinical pathway database, then generating at least one signal corresponding to a clinical pathway modification of the subsequent decision data elements in the clinical pathway database, and transmitting the at least one clinical pathway modification signal over the communication network to the receiving means of the client workstation.

Brief Summary Text (43):
In a further embodiment, the present invention provides a system for assessing utilization of medical resources based upon manipulation and analysis of statistical data related to clinical pathways, comprising a clinical pathway database for storing an initial procedure decision data element, corresponding to a decision point within the clinical pathway, and at least one subsequent decision data element corresponding to available subsequent decision points within the clinical pathway, a historical clinical pathway database for storing previously selected subsequent decision data elements, selected corresponding to the initial procedure decision data element, and, for each of the previously selected subsequent decision data elements, a utilization value corresponding to the decision data element processing means, including a storage device, for performing

the steps of selecting one of the at least one subsequent decision data elements, comparing the selected subsequent decision data element with the previously selected subsequent decision data elements stored in the historical clinical pathway database, and based upon predetermined correlation criteria, modifying the at least one subsequent decision data elements within the clinical pathway database, and statistical processing means, in communication with the clinical pathway database and the historical clinical pathway database, for performing the steps of accessing the historical clinical pathway database, computing pathway utilization value based on the accessed utilization values in the database, generating at least one signal corresponding to the pathway utilization value, and outputting the at least one utilization value signal to a signal processing means.

Brief Summary Text (44):
In another embodiment, the invention provides a system for rating medical care based upon manipulation and analysis of data related to clinical pathways, comprising a clinical pathway database for storing an initial procedure decision data element, corresponding to a decision point within the clinical pathway, and at least one subsequent decision data element corresponding to available subsequent decision points within the clinical pathway, a historical clinical pathway database for storing previously selected subsequent decision data elements, selected corresponding to the initial procedure decision data element, and, for each of the previously selected subsequent decision data elements, a rating value, processing means, including a storage device, for performing the steps of selecting one of the subsequent decision data elements, comparing the selected subsequent decision data element with the previously selected subsequent decision data elements stored in the historical clinical pathway database, based upon predetermined correlation criteria, modifying the subsequent decision data elements within the clinical pathway database, and statistical processing means, in communication with the clinical pathway database and the historical clinical pathway database, for performing the steps of accessing the historical clinical pathway database, computing a pathway rating value based on the accessed rating values in the historical database, generating at least one signal corresponding to the pathway rating value, and outputting the at least one rating signal to a signal processing means.

Detailed Description Text (19):
In accordance with the present invention, the database stores an initial procedure decision data element (using the structure set forth above) corresponding to a decision point within the clinical pathway and at least one, preferably a plurality of, subsequent decision data elements, corresponding to available subsequent decision points within the clinical pathway. The system also includes a historical clinical pathway database for storing previously selected subsequent decision data elements, selected corresponding to the initial procedure decision data element. In addition, the system includes a processing means, optionally including a storage device, for various steps. While the present invention has been described in terms of particular data structures and data flow, the computational steps could be carried out by any Von Neuman machine, i.e., the processing means can be any programmable digital computer, whether imbedded into a device or not or whether part of a network or not.

Detailed Description Text (23):
In addition to GAs, there are other suitable methods for attacking the present NP-complete problem. For instance, correlations can be viewed as patterns and the patterns then subjected to pattern matching routines. Such pattern matching is a known domain of neural networks. However, even if neural networks are used, it is preferred that the nodes and loadings still be determined by a GA. GAs can also be used in this manner to actually create analysis programs by determining an input grid for a finite state machine. Other methods for finding near optimal solutions for NP-complete problems could also be used to determine the optimal correlation matrix, such as simulated annealing. No matter the approach, one of skill in the

art would recognize that the present correlation problem is combinatorily explosive is likely impossible to be attacked at all with closed form or brute-force methods.

Detailed Description Text (61):
In a further embodiment, the system includes means for storing the selected subsequent decision data element in the storage device. Suitable storage devices include diskettes, random access memory, or any other device capable of storing digital information.

Detailed Description Text (63):
In another embodiment, the processing means further comprises means for, prior to modifying the subsequent decision data elements within the clinical pathway database, querying the user for authorization to make the modification. For instance, if the user is at a computer terminal, a prompt can be given to the user describing the correlation that was found and requesting authorization to, e.g., change the default clinical pathway presented to other users. Assuming the user is trusted or has valid access, the change can be made globally on behalf of all users of the system.

Detailed Description Text (65):
In another embodiment, the historical clinical pathway database further comprises a medical procedure data element corresponding to the initial and subsequent decision data elements for a particular medical procedure and wherein the processing means further comprises means for storing the medical procedure data element. In this system, the modified subsequent decision data elements are also stored within the historical clinical pathway database. The system includes means for correlating the modified subsequent decision data elements in the historical clinical pathway database with the medical procedure data element, means for querying the historical clinical pathway database and generating a signal corresponding to the subsequent decision data elements corresponding to a particular medical procedure, and means for outputting the signal to a signal processing means. Suitable signal processing means include, a communication network, a computer, a storage medium, a display, a printer, or the like.

Detailed Description Text (69):
In addition, in one embodiment, the present invention provides a client/server system for manipulation and analysis of data related to clinical pathways. Referring now to FIG. 4, one possible client/server configuration 400 useful for practicing the present invention is shown. The system accommodates an arbitrary number of physician or nurse clients 401. A major portion of the communication system of the invention is used to handle connections by physicians and nurses to the system. In one embodiment, data is converted internally to a more efficient format than the external standard HL7 protocol. All communications are coordinated by the server 402 of the system. When a physician or nurse requests information from a source 404 outside of the system, the information may be retrieved from an outside information server 403. Of course, both servers 402, 403 could be implemented on a single machine, if desired. The outside information server 403 contains a translation mechanism for handling translation to and from internal representations based on HL7. By interfacing with HL7, the system of the invention is capable of accessing patient information from existing HL7 external clients 404, as well as serving such information to HL7 systems requesting it.

Detailed Description Text (70):
Thus, the client/server system includes a communication network. In addition, the system includes at least one client workstation in communication with the communication network, where the client includes means (such as a modem or network adapter) for generating at least one signal corresponding to a clinical pathway decision and transmitting the at least one decision signal over the communication network. In addition, the client includes means (which can also be a modem or

network adapter) for receiving at least one signal corresponding to a clinical pathway modification from the communication network. The client further includes means for outputting the at least one modification signal to a signal processing means (such as a monitor, printer, digital storage device, network connection, or further computing system). The system also includes a server on the communication network and the server includes (locally or remotely via appropriate connectivity) the clinical pathway database for storing an initial procedure decision data element corresponding to a decision point within the clinical pathway and at least one subsequent decision data element corresponding to available subsequent decision points within the clinical pathway. In addition, also associated with the server is a historical clinical pathway database (the two databases could, of course, exist on a single machine and, in fact, could have overlapping storage) for storing previously selected subsequent decision data elements, selected corresponding to the initial procedure decision data element. Finally, the system includes processing means, in communication with the communication network, the client workstation, and the server, for performing various steps. The processing means is responsible for receiving the decision signal from the communication network and, based on the received decision signal, selecting one of the subsequent decision data elements. Then the processing means is responsible for comparing the selected subsequent decision data element with the previously selected subsequent decision data elements stored in the historical clinical pathway database, and, based upon predetermined correlation criteria, modifying the subsequent decision data elements within the clinical pathway database. Finally, the processing means is responsible for generating at least one signal corresponding to a clinical pathway modification of the subsequent decision data elements in the clinical pathway database and transmitting the at least one clinical pathway modification signal over the communication network to the receiving means of the client workstation.

Detailed Description Text (72):
In a further embodiment, the present invention provides a system for assessing utilization of medical resources based upon manipulation and analysis of statistical data related to clinical pathways, comprising a clinical pathway database for storing an initial procedure decision data element corresponding to a decision point within the clinical pathway, and at least one subsequent decision data element corresponding to available subsequent decision points within the clinical pathway. The system also includes a historical clinical pathway database for storing previously selected subsequent decision data elements selected corresponding to the initial procedure decision data element, and, for each of the previously selected subsequent decision data elements, a utilization value corresponding to the decision data element. The system also includes processing means, optionally including a storage device, for selecting one of the subsequent decision data elements and comparing the selected subsequent decision data element with the previously selected subsequent decision data elements stored in the historical clinical pathway database. Based upon predetermined correlation criteria, the system then modifies the subsequent decision data elements within the clinical pathway database. In addition, the system includes a statistical processing means, in communication with the clinical pathway database and the historical clinical pathway database, for accessing the historical clinical pathway database, computing a pathway utilization value based on the accessed utilization values in the database, generating at least one signal corresponding to the pathway utilization value, and outputting the at least one utilization value signal to a signal processing means.

Detailed Description Text (76):
In another embodiment, the invention provides a system for rating medical care based upon manipulation and analysis of data related to clinical pathways, including a clinical pathway database for storing an initial procedure decision data element, corresponding to a decision point within the clinical pathway, and at least one subsequent decision data elements corresponding to available subsequent decision points within the clinical pathway. The system also includes a historical

L7: Entry 1 of 2 File: USPT Dec 16, 2003

DOCUMENT-IDENTIFIER: US 6665647 B1
TITLE: Enterprise healthcare management system and method of using same

Abstract Text (1):
The enterprise healthcare management system and method includes remotely hosting turnkey health care applications and providing enterprise users access to the turnkey applications via a public network such as the Internet.

Brief Summary Text (7):
The field of the present invention is healthcare management systems for healthcare enterprises. More specifically, the present invention relates to providing networked software applications for use by healthcare facilities.

Brief Summary Text (11):
Most enterprises have computer systems, and many have established local area networks within their facilities. The established computer systems typically perform a variety of particular and discrete functions. For example, a hospital may have a clinical information system as described in U.S. patent application Ser. No. 08/977,522 for managing and presenting patient care management plans. The hospital may have other systems for accounting, insurance, and administrative functions. However, many of these established systems are dated or too inflexible to provide the information required to support health care enterprises in the modern managed care environment in an efficient and economical manner.

Brief Summary Text (12):
Thus, the current computer, network, and application systems used by health care enterprises are incapable of providing sufficient decision support with their existing computer facilities. Therefore, to remain viable, health care enterprises must upgrade their existing computer systems, expand networks, and possibly even re-cable. Further, the enterprise will need to phase-out existing applications as they phase-in new or updated applications. Enterprises also may need to add new applications to collect and track information not currently used.

Brief Summary Text (13):
Such a major project is beyond the financial and technical abilities of most health care enterprises. For example, upgrading computer, network, and application systems can cost millions of US dollars for an enterprise. With health care enterprises having an immediate need to improve financial performance, they are unlikely to make such an enormous expenditure in a timely manner. Thus, the enterprise must quickly improve financial performance, but is unable to expend the resources to provide the necessary information support.

Brief Summary Text (15):
Even for those enterprises willing to make the financial commitment and take the necessary time there is still significant risk. Since every enterprise has a unique mix of computers, networks, and applications, each enterprise also bears the tremendous risk associated with new system installation. In such a manner the new system can either under perform, or end up costing substantially more than expected. Either way, the new system has negatively impacted the financial performance of the enterprise, and as a result, the enterprise could be at risk for

financial failure. Thereby there exists a need for a new system that can provide health care enterprises with enhanced decision support information in a cost, effective manner. The new 'system further needs to be quickly and confidently installed without burdensome expense to the enterprise. It is also desirable that existing legacy applications, computers, and networks cooperate with the new system. In such a manner the enterprise preserves prior information technology investments.

Brief Summary Text (17):
It is therefore an object of the present invention to provide a new enterprise healthcare management system for providing enhanced decision support information to a health care enterprise in a cost effective manner.

Brief Summary Text (18):
In another separate object of the present invention the new healthcare management system should utilize existing legacy applications already established at health care enterprises.

Brief Summary Text (19):
Briefly, the above and further objects are realized by providing a new enterprise healthcare management system and method of using same. The enterprise healthcare management system and method includes remotely hosting turnkey health care applications and providing enterprise users access to the turnkey applications via a public network such as the Internet.

Brief Summary Text (21):
The enterprise also can utilize existing legacy applications, thereby preserving prior IT investments. Since enterprise users access the new system via a public network such as the Internet, only minimal networking capability is needed at the enterprise. In such a manner it is likely the enterprise can also utilize existing computer and network resources.

Drawing Description Text (3):
FIG. 1 is a block diagram showing an enterprise healthcare management system made in accordance with the present invention;

Drawing Description Text (4):
FIG. 2 is a flowchart of a method using an enterprise healthcare management system in accordance with the present invention;

Drawing Description Text (5):
FIG. 3 is a flowchart of another method using an enterprise healthcare management system in accordance with a present invention;

Drawing Description Text (6):
FIG. 4 is a flowchart of yet another method using an enterprise healthcare management system in accordance with the present invention;

Drawing Description Text (7):
FIG. 5 is a flowchart of how an enterprise healthcare management system made in accordance with the present invention uses information relating to a patient;

Drawing Description Text (9):
FIG. 7 is a flowchart of the process to install an enterprise healthcare management system made in accordance with the present invention.

Detailed Description Text (2):
Referring now to the drawings, and more particularly to FIG. 1 thereof, there is shown a new enterprise healthcare management system 10 which is constructed in accordance with the present invention. The enterprise healthcare management system

10 is for use in healthcare enterprises comprising one or more facilities. These facilities, for example, may provide a point-of-care for healthcare patients.

Detailed Description Text (3):
The enterprise healthcare management system 10 generally comprises a redundant application server 24 accessing the Internet at a backbone site 12 through point of presence 60. Such a redundant system linking to the Internet at a major point of presence provides an extremely high quality of service for any remote user accessing the application server 24. Further, application server 24 has compression and encryption systems for authorizing users and securing communications. Healthcare enterprises are established in differing physical and administrative configurations. For example a health care enterprise may be configured as a single facility enterprise 14, an Internet enterprise 16, or a widely distributed enterprise 18. These health care enterprises connect to the Internet via an Internet service provider (ISP). In such a manner care providers at healthcare enterprise facilities communicate with the application server in a high-quality and secure manner.

Detailed Description Text (4):
In operation the redundant application server 24 operates a suite of healthcare software applications 26 for managing a healthcare enterprise. The suite of healthcare software applications 26 comprise a turnkey health care management system that includes, for example, patient care, financial, and administrative applications. This turnkey solution operates at a single location remote from the healthcare enterprise. Via the Internet, users at healthcare enterprises interactively access applications in the suite 26 to perform patient, financial, or administrative tasks.

Detailed Description Text (5):
Since the enterprise is using the Internet to access the remotely hosted applications, the healthcare enterprise needs only computing resources sufficient to allow secure, quality access to the Internet. In such a manner healthcare enterprises can quickly and cost effectively begin using the advanced healthcare management software applications in the turnkey suite of applications 26.

Detailed Description Text (7):
Of course, a healthcare enterprise may already be successfully using a healthcare management application, for example, such as a financial application. If the healthcare enterprise desires to continue to use such a legacy program, the financial information from the legacy program is simply transmitted to the database and stored therein. Thereby a healthcare enterprise may continue to use a legacy financial program, but the data from the legacy program is still available to the enterprise healthcare management software for producing reports comprising multi-disciplinary information. This implementation flexibility further enables the turnkey enterprise healthcare management system 10 to efficiently manage different types of healthcare enterprises.

Detailed Description Text (8):
The healthcare management system 10 can be used whether the enterprise is a single facility enterprise 14 or a larger healthcare enterprise already interconnected with an intranet. Indeed the system is even flexible enough to manage a widely distributed enterprise 18 where multiple hospital facilities are not presently interconnected.

Detailed Description Text (9):
Referring again FIG. 1, components of the enterprise healthcare management system will be described in more detail. The Internet 20 is the world's most widely deployed network. The Internet 20 interconnects thousands of computers from around world. The Internet 20 uses a sophisticated addressing protocol to route information through the network. Since the particular path that electronic data may

take when routed through the Internet is not known, the Internet 20 is typically represented as a cloud. In such a manner information is accepted into the Internet 20 at one location, routed through various Internet servers within the cloud, and then received at a final location.

Detailed Description Text (10):
Access to the Internet may be provided by an Internet service provider (ISP), such as Internet service providers 94-100. For a fee the Internet service provider establishes an Internet address for a user. In such a manner that user is then able to send and receive information via the Internet 20.

Detailed Description Text (11):
The Internet service provider typically contracts with a communication provider, such as the local phone company, to provide a high speed communication line. The high speed line may be, for example, a DS-3 communication line. The Internet service provider connects the high-speed communication line to network hardware used to route Internet messages. This network hardware, which may be a router or switch, provides the Internet service provider with a point of presence on the Internet.

Detailed Description Text (12):
The Internet service provider also typically provides a server connected to the network hardware. The server may contain content such as textual, video, or music information accessible to others on the Internet. Further, this server will handle the administrative tasks associated with managing subscribers to the Internet service provider.

Detailed Description Text (13):
As described above the Internet service provider has a point of presence on the Internet provided by a communication provider such as the local phone company. The reliability of the Internet service provider's service therefore is limited by the quality of the communication line, the local phone company, and the communication line used by the local phone company. The highest reliability communication lines are typically operated by the major communication companies such as MCI, AT&T, Sprint, and other national carriers. These national carriers have central office facilities where high-capacity communication lines terminate. These high-capacity communication lines are often called the backbone of the Internet. Regional and other smaller Internet service providers then connect to the central office backbone in a hierarchical manner. Since access to the backbone is provided at a central office for a major carrier, such access is provided at the highest possible quality of service level.

Detailed Description Text (15):
The application server 24 at the backbone site 12 is a redundant computer system. The redundant computer system is shown as application server 24 and comprises computer A 21 interconnected with computer B 23. Computer A connects to computer B through communication link 114. Computer A connects to the point of presence 60 through communication line 112. Computer B connects to the point of presence 60 through another communication line 113. In such a manner each computer has a separate access to the Internet, thereby increasing the reliability of the application server 24. To further increase reliability, computer B could connect to the Internet 20 through a separate point of presence. Due to its redundant nature and close proximity to the Internet backbone, application server 24 has a very high quality of service.

Detailed Description Text (16):
The application server 24 operates a suite of software applications 26 for turnkey healthcare management at a healthcare enterprise. This suite of software applications 26 includes a clinical information system 25 for providing day-to-day patient management functions. For example the clinical information system 25

provides automated clinical flow sheets for planning and tracking specific care given to a patient. The application suites 26 may also include laboratory software 31. The laboratory software 31 provides administrative functions for managing and tracking procedures at a clinic or hospital laboratory. In a similar manner radiology software 33 provides for the managing and tracking of radiology procedures for a patient. Pharmacy software 35 tracks both prescription and non-prescription drugs used by the patient. Financial software 37 provides accounting and asset management features necessary to operate a modern healthcare enterprise.

Detailed Description Text (18):
The application software suite 26 also includes an Enterprise Master Patient Index (EMPI) for managing access to the application server 24. The EMPI has authorization and security information for establishing access rights for users. Further, the EMPI has basic patient information for assuring that information entered into any application is related to a valid patient.

Detailed Description Text (19):
Further enhanced security access to the application server 24 is provided through compression and encryption functions. These compression and encryption functions may also be provided at user devices in the healthcare enterprise. Compression functions, such as compression functions 40-49, not only add another layer of security to transmissions, but also make communications more efficient. Encryption functions, such as encryption functions 50-59, enable sensitive electronic data to be passed through the public Internet 20. Such sensitive data is encrypted at one end of the transmission and then decrypted at the other end of the transmission for secure communication. For example, a user at the nurse station device 75 of the single facility enterprise 14 desires to send sensitive clinical patent data related to a patient to the financial application 37. Security is established between the nurses station device and the application server before any sensitive data is transmitted.

Detailed Description Text (20):
In establishing security the encryption functions 58 at the nurses station 75 communicates with the encryption function 56 at the application server 24. The encryption functions 56 and 58 perform a handshaking procedure whereby agreement is reached on the type of encryption to use. Preferably security is established pursuant to the SecureIP standard. The SecureIP standard is an emerging standard for virtual private networks for providing a point-to-point connection between a server and an end user device. This point-to-point connection is often called a "tunnel". Once the secure tunnel is created, the sensitive information is transmitted.

Detailed Description Text (23):
FIG. 1 shows backbone site 19 having redundant computers 62 and 64 accessing the Internet via point presence 66. The backbone site 19 thereby provides service to healthcare enterprises geographically near backbone site 19.

Detailed Description Text (25):
As generally described above, the turnkey healthcare management system 10 has the flexibility to effectively and efficiently operate differing types of healthcare enterprises. For example, the healthcare management system 10 may be used to operate a single facility enterprise 14. The single facility enterprise 14 is typically a single stand-alone hospital. The hospital may already have an existing network in place such as network 132. To use the healthcare management system 10, the single facility enterprise 14 obtains access to the Internet through a networking device 83 coupled to Internet service providers 94 and 95. The networking device 83 may be, for example, a switch or router coupling to the enterprise's existing network. The networking device 83 couples to the first ISP 94 through a communication link 115. The networking device 83 establishes a second link to the Internet using communication line 116 connected to Internet service

provider 95. By providing two independent Internet service providers and communication links, system reliability is enhanced. Quality of service could be further increased by adding a second independent networking device for connecting to the second Internet service provider 95.

Detailed Description Text (26):
The single facility enterprise 14 comprises several devices needing to send and receive information to the turnkey healthcare management system 10. For example, as described above, a nurse at nursing station device 75 may need to access one or more of the applications operating on the application server 24. In a similar manner there may be a bedside device 77, such as a data display terminal, for sending information to and from the clinical information system 25 operating on the application server 24.

Detailed Description Text (29):
A healthcare enterprise may comprises several point of care facilities interconnected with an intranet. For example, intranet enterprise 16 comprises hospital 102, hospital 103, and hospital 104 connected with the intranet 123. Although the intranet enterprise 16 is shown having separate hospital facilities, these point of care facilities may also include clinics, laboratories, or pharmacies. The intranet enterprise 16 also accesses the Internet via dual Internet service providers, as described above. Thereby hospitals 102-104 access the Internet through networking device 84 which couples to Internet service provider 96 via communication link 117. A second Internet service provider 97 connects to networking device 805 through communication line 118. Each hospital or point of care: facility within the intranet enterprise 16 may thereby utilize applications in the turnkey software suite 26 as previously described. Information relating to the intranet enterprise 16 is separately stored in the central data repository 27. In such a manner enterprise wide reports can be generated showing the intranet enterprise 16 performance.

Detailed Description Text (31):
The clinical data repository 27 thereby has multiple partitions, with each partition holding healthcare management information for an enterprise. In such a manner reports can be generated indicating the performance of a single enterprise. Further, reports can be generated encompassing multiple enterprises. In such a manner the data and information stored for each enterprise is aggregated with information stored for other enterprises for producing system wide reports. Using such system wide reports, an enterprise can compare its performance against other healthcare enterprises.

Detailed Description Text (32):
Referring now to FIG. 2 there is shown a method 200 of using a turnkey enterprise healthcare management system. The method begins in block 202 by providing an application server and a database as previously described. Block 203 shows that financial, care management, and outcome tracking applications operate on the application server. The outcome tracking application is for tracking and reporting patient results. In such a manner, the outcome tracking application tracks how long the patient stayed at a point of care facility, what the outcome of the specific treatment was, and what the long-term prognosis for the patient was. For example, the system can track if the patient died, got better, or came down with another ailment. Combined with other information in the database, the outcome information is used to generate performance reports.

Detailed Description Text (33):
Block 204 shows the application server and the database are connected to the Internet at a major point of presence. As described above this major point of presence is preferably at a backbone site. The healthcare enterprise has an established network as shown in block 205. Secure communication tunnels are established between the application server and end-user devices on the established

network as shown in block 206. To use the healthcare management system, the enterprise need not invest substantial capital in computer hardware and software, but instead uses the healthcare management system on a fee basis. In such a manner block 207 shows that the enterprise is billed for the applications as utilized.

Detailed Description Text (36):
The healthcare management system is capable of supporting multiple enterprises. If multiple enterprises are operated as shown in block 215, then the information related to each of the separate healthcare enterprises is stored in a separate partition of the database as shown in block 216. The database engine can then be used to query across multiple database partitions as indicated in block 217. Block 218 shows that aggregate information can then be reported on the performance all managed multiple enterprises. The process then ends in block 219.

Detailed Description Text (37):
Referring now to FIG. 3, another method 230 using the healthcare management system is shown. Method 230 starts in block 231 with an established healthcare network. The established healthcare network is within a healthcare enterprise that has multiple points of care. The established healthcare network has data acquisition devices, bedside devices, and data display devices. Block 232 shows that an application server and a database is provided, with block 233 showing that the server and database are linked to the Internet at a major point presence. As described before, block 234 shows linking the established network to the Internet. Financial, care management, outcome tracking applications are operating on the server as shown in block 235. Those skilled in the art will recognize other applications may be added or substituted.

Detailed Description Text (42):
Referring now to FIG. 4 there is shown a method 260 for using the healthcare management system for multiple enterprises. Block 261 and 262 show that the application server and database are connected to the Internet at a major point of presence. Blocks 263 and 264 show that patient data, financial data, and patient outcome data is collected from an individual enterprise and transmitted to the application server. As described earlier, the database is logically partitioned for storing enterprise data into a separate partition as shown in blocks 265 and 266.

Detailed Description Text (44):
Referring now to FIG. 5 another method 300 of using an enterprise healthcare management system is shown. Method 300 provides an application server and a database in block 301 for running financial, care management, outcome tracking applications as shown in block 302. The application server and database are linked to the Internet at major point presence is shown in block 303. A patient is received at a point of care facility, such as a hospital, by a care provider. The care provider has a computing device connected to the Internet as shown in block 304. The care provider initiates a communication tunnel to the application server and the care providers computing device as shown in block 305. The application server has a database of security information stored in the EMPI. The EMPI information is compared with information received from the caregiver's terminal device to authorize the care giver to access the application server as shown in block 306.

Detailed Description Text (45):
Once authorized to access the application server, the caregiver collects patient specific information to facilitate admitting the patient as shown in block 307. The caregiver inputs collected information into the caregivers computer device in block 308 with information being transmitted to the care management application running on the application server as shown in block 309. The information collected from the patient, or information derived from the collected information, is stored in the database residing at the application server as shown in block 310. The care management applications running on the server generate a care management plan

responsive to the patient specific information entered by the caregiver as shown in block 311. This care management plan is also stored on the application server as shown in block 312.

Detailed Description Text (51):
Referring now to FIG. 7 a method 350 is shown for installing enterprise healthcare management system at an existing healthcare enterprise. Block 351 indicates that the installer provides an application server and a database. That application server remotely hosts turnkey healthcare management application suites, with the database storing multidisciplinary information as shown in block 352. The server and the database are linked to the Internet at major point presence as shown in block 353. The installer inventories established network resources to determine what network resources are available at the healthcare enterprise as shown in block 354. The installer installs the necessary hardware and software at the healthcare enterprise to initiate communication tunnels between the server and an end-user device on the established network as shown in block 355.

Detailed Description Text (53):
The installer then authorizes users at the healthcare enterprise to use interactively applications in the turnkey healthcare management application suite that are not duplicative of retained legacy applications as shown in block 360. In such a manner users at the healthcare enterprise can interactively use applications hosted on the application server for performing day-to-day patient and administrative functions for the healthcare enterprise. Finally in block 361 the installer uses a database searching engine to generate queries for interrogating the database to extract information indicative of enterprise performance. These queries are performed on multidisciplinary information to accurately portray enterprise performance.

Detailed Description Text (54):
The enterprise healthcare management system described above preferably uses the Internet for communication between the application server and the health care enterprise. However, the healthcare management system may use other public or private networks for establishing such communications. For example, the application server could be located proximate a health care enterprise and-directly couple to the enterprise's existing private network. Indeed, the application server could become a server on an enterprise's intranet network. In such a manner the application server remotely hosts the suite of health care applications, integrates with existing legacy applications, and generates multidiscipline enterprise performance reports. Similar to the implementation using the Internet, the enterprise can quickly and cost effectively utilize the enterprise healthcare management system.

Detailed Description Text (55):
Although the embodiments thus far described preferably utilize a suite of healthcare applications operating on the application server, other configurations are contemplated. The enterprise healthcare management system may offer a single application for use throughout the enterprise. In such a manner the enterprise can add new or augmented capabilities quickly and in a cost effective manner. For example, if a healthcare enterprise desires to add a care management application, such a care management application can be deployed enterprise-wide quickly, with little risk, and with minimal financial investment.

Detailed Description Text (56):
By using the enterprise healthcare management system and method disclosed herein, a healthcare enterprise can quickly and cost effectively generate critical decision support information. With such information, the healthcare enterprise is able to make informed decisions for improving financial performance while maintaining or improving patient care.

Other Reference Publication (1):
Marietti, Healthcareinformatics, "Linited Access Webways . . . The reality of intranet and extranet business models", Feb. 1998.*

Other Reference Publication (2):
Suzan Eich, "Honeywell Introduces Computer network Facility for Hospitals", Dateline Chicago, IL, Dialog file 621, Accession No. 00102603, Jul. 1985.*

CLAIMS:

1. A method of operating an enterprise healthcare management system for a first healthcare enterprise facility and a second healthcare enterprise facility independent of the first healthcare enterprise facility, comprising: establishing a first secure communication channel via a public network between an application server and a first end user device in the first enterprise facility and establishing a second secure communication channel via the public network between the application server and a second end user device in the second enterprise facility, the application server remotely hosting a healthcare application and having a database; receiving first healthcare data from the first end user and second healthcare data from the second end user; processing the first healthcare data and the second healthcare data with the healthcare application; storing the processed first healthcare data in a first portion of the database associated with the first healthcare enterprise facility and storing the processed second healthcare data in a second portion of the database associated with the second healthcare enterprise facility; configuring the database to accept legacy information derived from a legacy application operating at each of the first and second healthcare enterprise facilities, wherein the functions in the healthcare application are not duplicative of the legacy application; and generating a query to extract information from the database relevant to a respective one of the first and second healthcare enterprise facilities derived from the healthcare data and the legacy information for managing and tracking a performance of the respective one of the first and second healthcare enterprise facilities, wherein healthcare data in the first portion of the database is only accessible to the first end user device and healthcare data in the second portion of the database is only accessible to the second end user device.

3. The method of claim 1 wherein each of first and second enterprise facilities is part of a independent private network.

5. The method of claim 1 wherein the public network is the Internet.

6. The method of claim 1 wherein an access point of the application server to the public network is a major point of presence on the public network.

26. A healthcare management system for a first healthcare enterprise facility and a second healthcare enterprise facility independent of the first healthcare enterprise facility, comprising: an application server and a database, the application server remotely hosting one or more healthcare applications; an application server and a database, the application server remotely hosting one or more healthcare applications; an access point to a network at which the application server and link to a public network; means for initiating secure communication between the application server and a first end user device at the first enterprise facility and for initiating secure communication between the application server and a second end user device at the second enterprise facility; means for receiving healthcare data from the first and second end user devices at the one of the healthcare applications; means for processing the received healthcare data; and means for storing the processed healthcare data from the first end user device in a first portion of the database associated with the first enterprise facility and for storing the processed healthcare data from the second end user device in a second portion of the database associated with the second enterprise facility, means for

configuring the database to accept legacy information derived from a legacy application operating at each of the first and second healthcare enterprise facilities, wherein the functions in the healthcare application are not duplicative of the legacy application; and means for generating a query to extract information from the database relevant to a respective one of the first and second healthcare enterprise facilities derived from the healthcare data and the legacy information for managing and tracking a performance of the respective one of the first and second healthcare enterprise facilities, wherein healthcare data in the first portion of the database is only accessible to the first end, user device and healthcare data in the second portion of the database is only accessible to the second end user device.

27. The healthcare management system according to claim 26 further comprising a redundant application server.

28. The healthcare management system according to claim 26 further including means for operating the database on the application server.

29. The healthcare management system according to claim 26 wherein each of the first and second enterprise facilities is part of a private network.

30. The healthcare management system according to claim 29 wherein each of the first and second enterprise facilities is part of an intranet.

31. The healthcare management system according to claim 26 wherein the public network is the Internet.

32. The healthcare management system according to claim 26 wherein the access point is a major point of presence on the network.

33. The healthcare management system according to claim 26 wherein one of the healthcare applications includes a financial application.

34. The healthcare management system according to claim 26 wherein one of the healthcare applications includes a clinical information management application.

35. The healthcare management system according to claim 27 wherein one of the healthcare applications includes an outcome application.

36. The healthcare management system according to claim 26 wherein one of the healthcare applications includes a word processing application.

37. The healthcare management system according to claim 26 wherein the means for initiating includes means for establishing a virtual private network.

38. The healthcare management system according to claim 26 wherein the means for initiating includes a means for using the SecureIP handshaking protocol.

39. The healthcare management system according to claim 26 wherein the healthcare data is patient specific data for input to a clinical information system operating on the application server.

40. The healthcare management system according to claim 26 wherein the healthcare data is financial data for input to a financial application operating on the application server.

41. The healthcare management system according to claim 26 wherein the healthcare data is outcome data for input to an outcome application operating on the application server.

42. The healthcare management system according to claim 26 further including means for storing in the database information from multiple disciplines.

43. The healthcare management system according to claim 42 further including means for querying the stored multidiscipline data to generate reports on a performance of one of the first and second enterprise facilities.

44. The healthcare management system according to claim 26 further including the means for storing in the database information received from a legacy program operating at one of the first and second enterprise facilities.

45. The healthcare management system according to claim 44 further including means for querying the stored healthcare data, including the legacy data, to generate reports on a performance of one of the first and second enterprise facilities.

46. The healthcare management system according to claim 26, further comprising: means for receiving a query from the first end user device; means for querying only processed healthcare data in the first portion of the database in response to the query from the first end user device; and means for generating a report based on a response to the query of the first portion of the database.

47. The healthcare management system according to claim 26 further including means for installing the application server and the database proximate a central office facility for a communication carrier.

48. The healthcare management system according to claim 47 further including means for installing the application server and the database in the central office facility.

49. The healthcare management system according to claim 47 wherein the communication carrier is one selected from the group consisting of MCI, AT&T, and SPRINT.

50. A method of operating a healthcare management system, comprising: hosting remotely on an application server a healthcare application configured to store application information in a database; linking the application server and the database to a public network; initiating secure communication between end user devices at an enterprise facility and the application server; configuring the database to accept legacy information derived from a legacy application operating at the enterprise facility, wherein the functions in the healthcare application are not duplicative of the legacy application; and generating a query to extract information from the database derived from the application information and the legacy information for managing and tracking a performance of the enterprise facility.

51. The method of claim 50 wherein the public network is the Internet.

52. The method of claim 50 wherein the enterprise facility is a private network.

54. The method of claim 50 wherein the linking step includes the server and the database to the network at a major point of presence.

Previous Doc Next Doc Go to Doc#